Test report

Acoustic test report

268.416
Thomas-Krenn.AG

Server PC
SR105

Customer:

Thomas-Krenn.AG
Speltenbach-Steinäcker 1
94078 Freyung

Deutscher
Akkreditierungs
Rat
DAR

Registration number: DAT-P-224/95-02

EMV TESTHAUS GmbH

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Accreditation:

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DAR

Registration number: DAT-P-224/95-02
Valid until 08.06.2011

Place of Inspection:

EMV TESTHAUS GmbH
Gustav-Hertz-Strasse 35
94315 Straubing

The technical accuracy is guaranteed through the quality management of the EMV TESTHAUS GmbH.

Table of contents

1. Test regulation and standards

Referenced standards

DIN EN ISO 7779: 11-2002	Measurement of airborne noise emitted by computer and business equipment.
ISO 9296: 1988	Declared noise emission values of computer and business equipment.

Including following tests

Sound power level	**DIN EN ISO 7779: 11-2002, Chapter 7**	Methods for determination of sound power levels of equipment under essentially free-field conditions over a reflecting plane.
Sound pressure level	**DIN EN ISO 7779: 11-2002, Chapter 8**	Methods of measuring sound pressure levels at the operator and bystander position.
Impulsive sound pressure levels and discrete tones	**DIN EN ISO 7779: 11-2002, Annex D, E**	Measurement of impulsive pressure levels and discrete tones at the operator position
Noise emission values	**ISO 9296: 1988**	

2. Equipment under test

Equipment description

Product:	Server PC
Customer:	Thomas-Krenn.AG
Manufacturer:	Thomas-Krenn.AG
Model:	SR105
Order Number:	268.416
Serial Number:	9000050157
SAP Number:	N/A
Article Number	N/A
Remark:	N/A
Overall dimension:	0,20 m (W) x 0,44 m (D) x 0,57 m (H)

List of components

Component	Model No.	Part No.	Serial No.	Rev.	Remark
Drives					
HDD	**500GB WD Raid Edition 3**	**4**			
CD-Rom	**LG DVD+/- RW SATA**				
Boards					
Mainboard	**Supermicro X7SBL-LN1**				
CPU	**Intel Xeon Quad Core 2,83Ghz**				
CPU Cooler	**Supermicro Low Noise single CPU Cooler**				
RAM	**2048MB ECC DDR2 667-RAM**				
Graphic card	**On board**				
Enclosure	**3 Ware SATA Raidcontroller**				
Case Fan	**Silent Cooler 120x120x25**				

Photo documentation – EUT

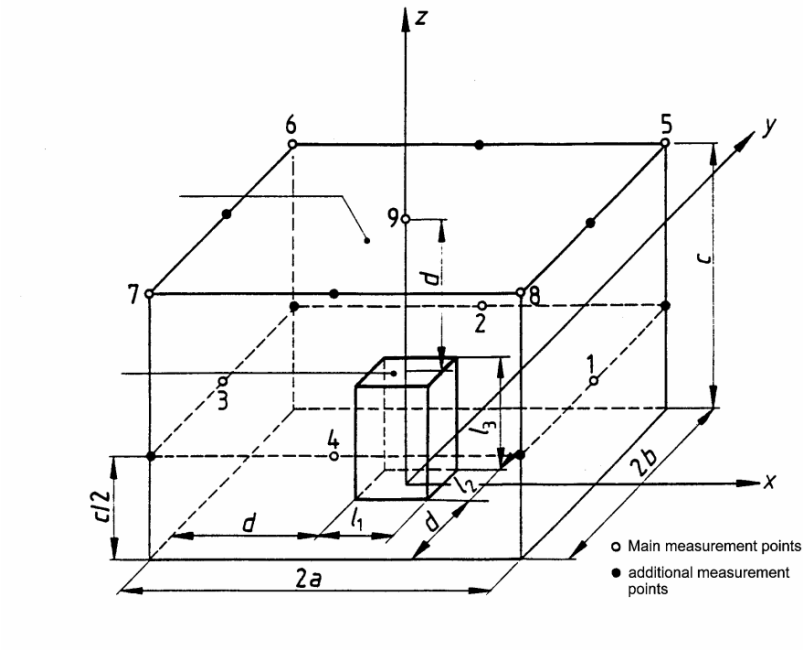
3. Test specification

Operating modes

1. Operating (ODD):	DVD movie was running.
Test Program:	Burn in Test (CD/DVD 100%)
2. Operating (HDD):	HDD in full operation mode, random block read.
Test Program:	Winthrax
3. Operating (System):	90% CPU workload
Test Program :	Burn in Test
4. Idle mode:	Windows desktop
Test Program:	N/A

Test setup

For the measurement the EUT is placed on a test table according to DIN EN ISO 7779: 11-2002, arrangement with 9 measurement points.



Measurement points

EUT dimensions	l_1 =	0,20 m
	l_2 =	0,57 m
	l_3 =	0,44 m
Measurement distance	d =	1,0 m
	a =	1,10 m
	b =	1,28 m
	c =	1,44 m
Measuring surface	S =	19,34 m²
Surface sound value	Ssp	12,9 dB
Reference area	S_0 =	1,0 m²

Measurement point	Coordinates		
	x	y	z
1	1,10 m	0,00 m	0,72 m
2	0,00 m	1,28 m	0,72 m
3	-1,10 m	0,00 m	0,72 m
4	0,00 m	-1,28 m	0,72 m
5	1,10 m	1,28 m	1,44 m
6	-1,10 m	1,28 m	1,44 m
7	-1,10 m	-1,28 m	1,44 m
8	1,10 m	-1,28 m	1,44 m
9	0,00 m	0,00 m	1,44 m

Formulas:

$a = 0.5\ l_1 + d$ $\quad b = 0.5\ l_2 + d$ $\quad c = l_3 + d$ $\quad S = 4(ab + bc + ca)$

Surface sound value $= 10 \lg \frac{S}{S_0}$; $S_0 = 1m^2$

Measuring conditions

Background noise level		16 dB
Room correction	K_2 =	1,42 dB
Production telerance	PT	3,0 dB
Absorption factor	α =	0,5
Length		10,0 m
Width		10,0 m
Height		5,0 m
Reference area	A =	200,00 m²

Climatic parameters

Air temperature	23	°C
Relative humidity	43.8	%
Barometric pressure	102.7	kPa

Measuring method

Measuring mode	FAST
Test time	30 s
Frequency range	20Hz to 20 kHz
Frequency weighting	A-weighting according to DIN EN 60651
Calibration method	Acoustic calibrator Brüel & Kjaer Type 4231

Measurement uncertainty

Calibrator 4231 (Brüel & Kjaer)	± 0,2dB
2250 (Brüel & Kjaer)	± 0,3dB
Noisetable (EMV Testhaus)	± 0,5 dB
Measurement distance	± 0,1 dB

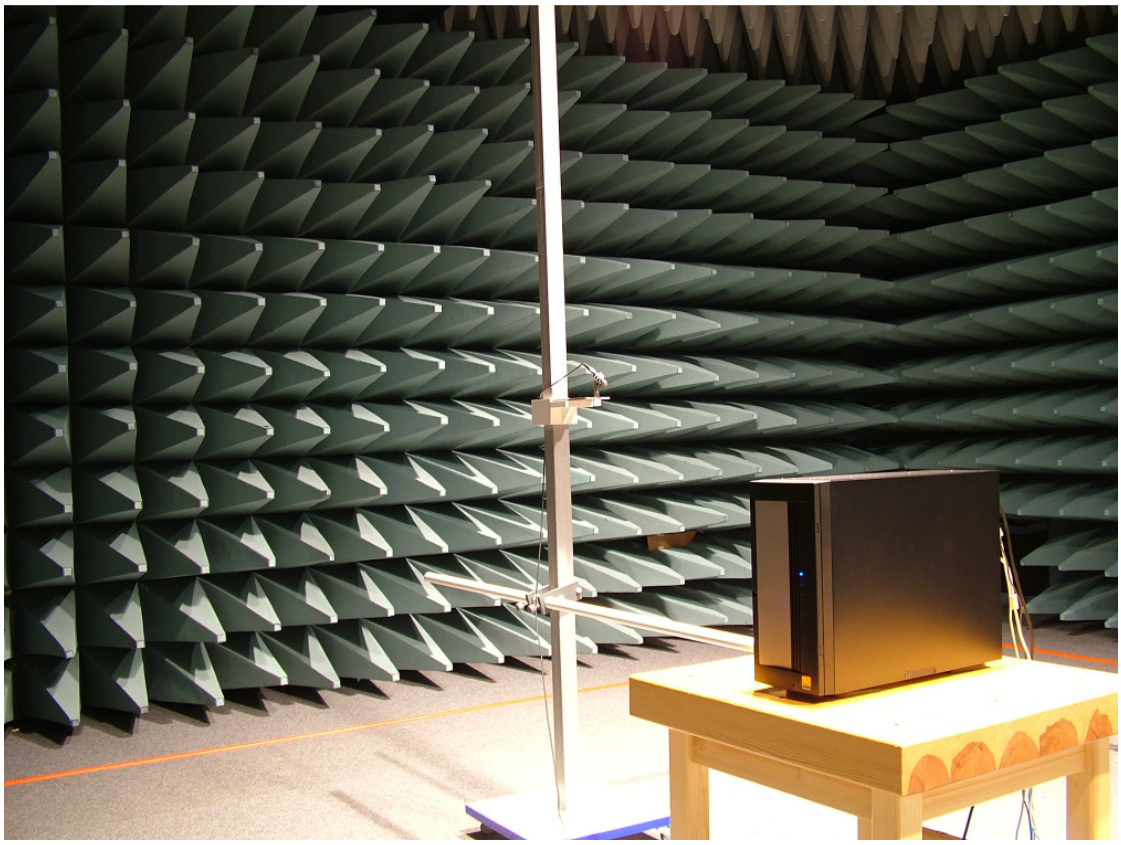
Location of measurement

Description	Manufacturer	Inventory Nr.
Anechoic chamber	EMV **TESTHAUS** GmbH	100047

Measurement equipment

	Description	Manufacturer	Inventory Nr.
☑	2250	Brüel & Kjaer	100151
☑	Calibrator	Brüel & Kjaer	100098

Photo documentation – Test setup



Test related measurement inaccuracies have to be taken into consideration when evaluating the test results.
All used test instrument as well as the test accessories are calibrated at regular intervals.

4. Summary of test results

Noise emission values according to ISO 9296: 1988

	Sound pressure level L_{pf}
Operation mode 1: ODD	31,3 dB(A)
Operation mode 2: HDD	32,9 dB(A)
Operation mode 3: System	31,7 dB(A)
Idle mode	29,7 dB(A)

If the minimum distance to the background noise is less than 6 dB, the value for standby is determined as the upper limit according to DIN EN 7779: 11-2002

5. Test result

Test 1: ODD, operating mode

Measuring data

Measurement point	Sound pressure level L_{pA}	
	1	33,1 dB(A)
	2	35,3 dB(A)
	3	33,6 dB(A)
	4	31,8 dB(A)
	5	30,7 dB(A)
	6	31,0 dB(A)
	7	30,8 dB(A)
	8	30,5 dB(A)
	9	34,7 dB(A)
Average Sound pressure level	L'_p =	32,7 dB
Sound pressure level	L_{pf} =	31,3 dB
Background noise correction	K_1 =	0,00 dB
Surface sound pressure level	S_{SP} =	12,9 dB
Production tolerance	PT =	3,0 dB
A-weighted sound power level	L_{WAE} =	44,2 dB(A)
A-weighted sound power level including production and measurement tolerances	L_{WAd} =	47,2 dB(A)

$$L_p = 10\lg\left[\frac{1}{N}\sum_{i=1}^{N}10^{0,1L_{pi}}\right]$$

Remarks:

$$L_{pf} = L'_p - K_1 - K_2$$

$$L_{WAE} = L_{pf} + S_{SP}$$

$$L_{WAd} = L_{WAE} + PT$$

Test 2: HDD operating mode, random block read

Measuring data

Measurement point	Sound pressure level L_{pA}	
	1	33,9 dB(A)
	2	36,9 dB(A)
	3	36,4 dB(A)
	4	34,2 dB(A)
	5	32,3 dB(A)
	6	32,8 dB(A)
	7	31,6 dB(A)
	8	31,7 dB(A)
	9	35,4 dB(A)
Average Sound pressure level	L'_p =	34,3 dB
Sound pressure level	L_{pf} =	32,9 dB
Background noise correction	K_1 =	0,00 dB
Surface sound pressure level	S_{SP} =	12,9 dB
Production tolerance	PT =	3,0 dB
A-weighted sound power level	L_{WAE} =	45,8 dB(A)
A-weighted sound power level including production and measurement tolerances	L_{WAd} =	48,8 dB(A)

$$L_p = 10\lg\left[\frac{1}{N}\sum_{i=1}^{N}10^{0,1L_{pi}}\right]$$

Remarks:

$$L_{pf} = L'_p - K_1 - K_2$$

$$L_{WAE} = L_{pf} + S_{SP}$$

$$L_{WAd} = L_{WAE} + PT$$

Test 3: System, operating mode

Measuring data

Measurement point	Sound pressure level L_{pA}	
	1	32,8 dB(A)
	2	36,4 dB(A)
	3	34,2 dB(A)
	4	31,6 dB(A)
	5	31,3 dB(A)
	6	32,0 dB(A)
	7	31,4 dB(A)
	8	31,1 dB(A)
	9	34,0 dB(A)
Average Sound pressure level	L'_p =	33,1 dB
Sound pressure level	L_{pf} =	31,7 dB
Background noise correction	K_1 =	0,00 dB
Surface sound pressure level	S_{SP} =	12,9 dB
Production tolerance	PT =	3,0 dB
A-weighted sound power level	L_{WAE} =	44,6 dB(A)
A-weighted sound power level	L_{WAd} =	47,6 dB(A)
including production and measurement tolerances		

$$L_p = 10\lg\left[\frac{1}{N}\sum_{i=1}^{N}10^{0,1L_{pi}}\right]$$

Remarks:

$$L_{pf} = L'_p - K_1 - K_2$$

$$L_{WAE} = L_{pf} + S_{SP}$$

$$L_{WAd} = L_{WAE} + PT$$

Test 4: Idle mode

Measuring data

Measurement point	Sound pressure level L_{pA}	
	1	31,1 dB(A)
	2	33,9 dB(A)
	3	32,3 dB(A)
	4	30,3 dB(A)
	5	29,9 dB(A)
	6	30,7 dB(A)
	7	29,7 dB(A)
	8	29,0 dB(A)
	9	32,5 dB(A)
Average Sound pressure level	L'_p =	31,3 dB
Sound pressure level	L_{pf} =	29,7 dB
Background noise correction	K_1 =	0,15 dB
Surface sound pressure level	S_{SP} =	12,9 dB
Production tolerance	PT =	3,0 dB
A-weighted sound power level	L_{WAE} =	42,6 dB(A)
A-weighted sound power level	L_{WAd} =	45,6 dB(A)
including production and measurement tolerances		

$$L_p = 10\lg\left[\frac{1}{N}\sum_{i=1}^{N}10^{0,1L_{pi}}\right]$$

Remarks:

$$L_{pf} = L'_p - K_1 - K_2$$

$$L_{WAE} = L_{pf} + S_{SP}$$

$$L_{WAd} = L_{WAE} + PT$$

Straubing, September 17, 2008

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TM / EMV **TESTHAUS** GmbH